Key Native Ecosystem Plan for Riversdale-Orui Coast

2016-2019

greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

Contents

1. Key Native Ecosystem plans

The Wellington region's native biodiversity has declined since people arrived and the ecosystems that support it face ongoing threats and pressures. Regional councils have responsibility for maintaining indigenous biodiversity, as well as protecting significant vegetation and habitats of threatened species, under the Resource Management Act 1991 (RMA).

Greater Wellington Regional Council's (GWRC) Biodiversity Strategy (2016)[1] sets a framework that guides how GWRC protects and manages biodiversity in the Wellington region to work towards the vision below.

GWRC's vision for biodiversity

Healthy ecosystems thrive in the Wellington region and provide habitat for native biodiversity

The Strategy provides a common focus across the council's departments and guides activities relating to biodiversity under this overarching vision, which is underpinned by four operating principles and three strategic goals. Goal One drives the delivery of the Key Native Ecosystem (KNE) programme.

Goal One

Areas of high biodiversity value are protected or restored

The KNE programme is a non-regulatory voluntary programme that seeks to protect some of the best examples of original (pre-human) ecosystem types in the Wellington region by managing, reducing, or removing threats to their ecological values. Sites with the highest biodiversity values have been identified and prioritised for management. Sites are identified as of high biodiversity value for the purposes of the KNE programme by applying the four ecological significance criteria described below.

Representativeness	Rarity/ Distinctiveness	Diversity	Ecological context
The extent to which ecosystems and habitats represent those that were once typical in the region but are no longer common place	Whether ecosystems contain Threatened/At-risk species, or species at their geographic limit, or whether rare or uncommon ecosystems are present	The levels of natural ecosystem diversity present i.e. two or more original ecosystem types present	Whether the site provides important core habitat, has high species diversity, or includes an ecosystem identified as a national priority for protection

A site must be identified as ecologically significant using the above criteria and be considered sustainable for management in order to be considered for inclusion in the KNE programme. Sustainable for the purposes of the KNE programme is defined as: a site where the key ecological processes remain intact or continue to influence the site and resilience of the ecosystem is likely under some realistic level of management.

KNE sites can be located on private or publically-owned land. However, land managed by the Department of Conservation (DOC) is generally excluded from this programme.

KNE sites are managed in accordance with three-year KNE plans such as this one, prepared by the GWRC's Biodiversity department in collaboration with the landowners, tangata whenua and other stakeholders. These plans outline the ecological values, threats, and management objectives for sites and describe operational activities such as ecological weed and pest animal control. KNE plans are reviewed regularly to ensure the activities undertaken to protect and restore the KNE site are informed by experience and improved knowledge about the site.

2. Riversdale-Orui Coast Key Native Ecosystem

The Riversdale-Orui Coast KNE site (60.8ha) comprises a variety of coastal ecosystems including sand dunes, the lower reaches of the Motuwairaka Stream and estuary, and salt marsh at Riversdale Beach on the eastern Wairarapa coast. See Appendix 1, Map 1 for the KNE site boundary.

The KNE site is important for a wide range of coastal and wetland bird species[2] and is the only known breeding site for New Zealand dotterel (*Charadrius obscurus*) in the Wellington region[3]. The southern end of the KNE site is adjacent to the Homewood Coast KNE site. These KNE sites combined form an important habitat network for native flora and fauna.

3. Landowners, management partners and stakeholders

GWRC works in collaboration with landowners and other interested parties (management partners and stakeholders) where appropriate to achieve shared objectives for the site. In preparing this plan GWRC has sought input from landowners and relevant stakeholders, and will continue to involve them as the plan is implemented.

3.1. Landowners

The KNE site is predominantly public land administered by Masterton District Council (MDC). The Crown also has legal ownership over several small areas of marginal strip.

The Riversdale Recreation Reserve (38.4ha) is managed by MDC under the Riversdale Recreation Reserve Management Plan and Development Concept Report. This document was compiled in 1996[4]. Another 18.4ha, which is a mixture of marginal strip, esplanade and local purpose reserve land, is included in the KNE site. This 18.4ha is managed under MDC's District Plan and the Reserves Act 1977.

The Crown owns 4ha of marginal strip at the Riversdale Recreation Reserve and Motuwairaka Stream mouth within the KNE site. This area is managed by the Department of Conservation (DOC).

3.2. Management partners and key stakeholders

The management partners at this KNE site are GWRC, MDC, DOC, the Wairarapa branch of the Royal Forest and Bird Protection Society of New Zealand (F&B), the Riversdale Beach Dune Management Committee and the Riversdale Beach Ratepayers Association.

Within GWRC, the Biodiversity, Biosecurity and Land Management departments are involved with the management of the KNE site. The Biodiversity department plans and coordinates biodiversity management activities and provides biodiversity advice. The Biosecurity department carries out pest plant and animal control activities. The Land Management department works with the local community at the Riversdale Beach sand dunes undertaking restoration planting and ecological weed control. Land Management work with farmers in the wider area under their Farm Environment Plan (FEP) programme, advising on and supporting sustainable land use, soil conservation

and water quality initiatives. Land Management also administers various catchment schemes such as the Whareama and Homewood catchment schemes.

MDC fund and support community-based dune restoration carried out with the Riversdale Beach Dune Management Committee. The partnership is subject to a Memorandum of Understanding and the Committee works under terms of reference drawn up in 2013[5]. MDC also fund and carry out reserve management work in the Riversdale Recreation Reserve.

DOC manages land on behalf of the Crown and is on the Riversdale Beach Dune Management Committee.

F&B work in partnership with GWRC Biodiversity department and assist with managing the shorebird nesting habitat in the northern Riversdale dunes. They maintain the semi-permanent fencing built to protect this habitat, erect temporary fencing with materials supplied by GWRC during the nesting season outside this area if required, and actively work to improve nesting success, particularly of New Zealand dotterels. They also provide information about the nesting birds to residents and visitors to the area to educate and raise awareness.

The Riversdale Beach Ratepayers Association and local residents support the protection of nesting shorebird habitat by providing information to the public about the nesting shorebirds and their habitat.

Rangitane o Wairarapa and Ngāti Kahungunu ki Wairarapa iwi have identified the lower reaches of the Motuwairaka Stream as being of significance for mahinga kai and wāhi tapu values[6]. Ngai Tumapuhia a Rangi ki Motuwairaka (Ngāti Kahungunu) marae and its hapu have mana whenua in this area[7].

4. Ecological values

This section describes the various ecological components and attributes that make the KNE site important. These factors determine the site's value at a regional scale and how managing it contributes to the maintenance of regional biodiversity. Examples of values are the provision of important habitat for a threatened species, or particularly intact remnant vegetation typical of the ecosystem type. The ecological values of a site are used to prioritise allocation of resources to manage KNE sites across the region.

3.1 Ecological significance

The Riversdale-Orui Coast KNE site is located within the Eastern Wairarapa Ecological District and is typical of the ecological district that is characterised by a long coastline with rocky points and cliffs, extensive coastal reefs and sandy beaches[8]. It has warm summers with spring and summer droughts, and an annual rainfall of 1,000 to 1,400mm per annum[9].

Of note in recognising the ecological values at the Riversdale-Orui Coast KNE site are the following:

Naturally uncommon ecosystems: Several rare ecosystem types are found here associated with the geological diversity in the region, including active and stable sand dunes, dune slacks, lagoons (Nationally Endangered) and estuaries (Nationally Vulnerable)[10].

Threatened Environments: The entire Riversdale-Orui Coast KNE site is classified as Acutely Threatened having less than 10% of the original cover of indigenous vegetation remaining[11].

Threatened species: There are three plant species with a national threat status, and four with a regional threat status. Twenty bird, three freshwater fish and one invertebrate species with national risk status have been recorded at the KNE site. Nationally threatened species are listed in Appendix 2 and regionally threatened plant species in Appendix 3.

3.2 Ecological features

The KNE site is comprised of sand dunes, wetlands, estuarine and salt-marsh ecosystems that in addition to threatened plants provides habitat for several species of native shore and wetland birds, freshwater fish and invertebrates.

Habitats and vegetation

Sand dune systems

Sand dune ecosystems are present throughout the majority of the KNE site, encompassing the northern Riversdale dunes, Riversdale Beach dunes and Riversdale Recreation Reserve dunes.

The northern Riversdale dunes (located immediately north of the Motuwairaka stream estuary) are sparsely vegetated with native plants. However, the foredunes do contain pockets of spinifex (*Spinifex sericeus*) and sand carex (*Carex pumila*) in moist, sandy areas in the back dune.

The Riversdale Beach dunes are within a narrow strip immediately off the beach and contain spinifex, although marram (*Ammophila arenaria*) is dominant. Spinifex, pīngao (*Ficinia spiralis*), sand coprosma (*Coprosma acerosa*), sand tussock (*Poa billardierei*) and wīwī (*Ficinia nodosa*) have been planted in recent years as part of a joint community restoration project ongoing with MDC and GWRC.

The foredunes in the Riversdale Recreational Reserve contain spinifex and some planted pīngao (though again marram is dominant). The back dunes, which are 250m wide in places[12], extend up to the base of a steep escarpment and contain a mix of marram, wīwī, bracken fern (*Pteridium esculentum*), pōhuehue (*Muehlenbeckia complexa*) and sand coprosma. Towards the base of the escarpment, a few matagouri (*Discaria toumatou*) plants can be found[13]. The escarpment itself is primarily grassland with plantation pine trees (*Pinus radiata*) and some regenerating native plant species such as māhoe (*Melicytus ramiflorus*) and karamū (*Coprosma robusta*).

At the southern boundary of the KNE site the sand has accumulated to form steep dunes vegetated by marram and spinifex. Areas of sand coprosma, sand daphne (*Pimelea arenaria*) and wīwī are present.

Freshwater wetland systems

At the southern end of the KNE site is a large wetland (2ha) listed as Significant under the proposed Natural Resources Plan (pNRP)[14]. This wetland is vegetated with raupō (*Typha orientalis*), harakeke, toetoe, giant umbrella sedge (*Cyperus ustulatus*) and cabbage trees. A survey of this wetland in 2013 recorded the nationally-threatened (At Risk) spotless crake (*Porzana tabuensis*)[15].

A dune swale (a lower-lying, often damp dune depression) containing raupō, harakeke, and wīwī runs behind the entire length of the Riversdale Recreation Reserve and connects into the wetland area at the southern KNE site boundary.

Estuarine systems

The Motuwairaka Stream estuary, comprising of the lower reaches of the Motuwairaka Stream, areas of saltmarsh, and ephemeral lagoon, has significant biodiversity values[16]. In the tidal reaches three-square (*Schoenoplectus tabernaemontani*) lines the tidal banks, along with pūrua (*Bolboschoenus caldwellii*) and small areas of remuremu (*Selliera radicans*) coastal turf. The upper reaches of the estuary are more freshwater-dominated and contain mainly raupō.

The Motuwairaka Stream flows out over the beach following various routes depending on water level but often flows north to form an ephemeral lagoon[17,18]. Very high tides, storms and seepage contribute water to the lagoon. A thick bed of horse's mane (*Ruppia polycarpa*) flourishes along the landward edge of the lagoon[19].

Species

Birds

The KNE site provides habitat for a wide range of common and threatened native shore and wetland birds. Notable threatened bird species include the New Zealand dotterel or tūturiwhatu (*Charadrius obscurus*), banded dotterel (*Charadrius bicinctus*),

black-billed gull (*Larus bulleri*), red-billed gull (*Larus novaehollandiae*), black-fronted tern (*Chlidonias albostriatus*), Caspian tern (*Hydroprogne caspia*), white-fronted tern (*Sterna striata*), New Zealand grebe (*Poliocephalus rufopectus*), spotless crake, wrybill (*Anarhynchus frontalis*), South Island oystercatcher (*Haematopus finschii*), pied stilt (*Himantopus himantopus*), New Zealand pipit *(Anthus novaeseelandiae*), eastern bar-tailed godwit (*Limosa lapponica*), fluttering shearwater (*Puffinus gavial*), royal spoonbill (*Platalea regia*), little black shag (*Phalacrocorax sulcirostris*), black shag (*Phalacrocorax carbo*) and northern little blue penguin (*Eudyptula minor*)[20].

Other more common species include variable oystercatcher (*Haemotopus unicolor*), paradise shelduck (*Tadorna vareigata*), southern black-backed gull (*Larus domincanus*) and white-faced heron (*Egretta novaehollandiae*).

Fish and crustaceans

The Motuwairaka Stream estuary is known to support common bully (*Gobiomorphus cotidianus*), shortfin eel (*Anguilla australis*), common smelt (*Retropinna retropinna*) and koura (*Paranephrops* spp.)[21]. The estuary is also suitable habitat for spawning inanga (*Galaxias maculatus*)[22].

Longfin eel (*Anguilla dieffenbachii*), shortfin eel, and redfin bully (*Gobiomorphus huttoni*) have been recorded from further upstream[23]. All these species are diadromous, meaning they migrate between salt and fresh water during their lifetime, and will pass through the estuary during their lifecycle.

Invertebrates

Katipō spiders (*Latrodectus katipo*) have been recorded at the dunes on the southern edge of the KNE site[24].

5. Threats to ecological values at the KNE site

Ecological values can be threatened by human activities, and by introduced animals and plants that change the natural balance of native ecosystems. The key to protecting and restoring biodiversity as part of the KNE programme is to manage the threats to the ecological values at the site.

5.1. Key threats

Ecological weeds are widespread throughout the KNE site. As a result they are considered the primary threat to the ecological values here. Ecological weeds displace native plant species such as pīngao and spinifex. These native species perform an important function in dune ecosystems, binding sand together, thereby providing stability for the whole dune ecosystem.

Marram grass is the most dominant ecological weed present within the KNE site. Marram is an ecological transformer, altering sand dune structure and function, creating higher and steeper dune systems that are more unstable than would naturally occur in a pīngao and spinifex-dominated dunes system. Compared to marram dunes native dune ecosystems have the added benefit of being able to recover and repair faster following storm events.

Other ecological weeds found in the KNE site include typical coastal exotics such as gazania (*Gazania* spp.), arctotis (*Arctotis stoechadifolia*), cape weed (*Arctotheca calendula*), wilding pine (*Pinus radiata*), pampas (*Cortaderia selloana*) and lupin (*Lupinus arboreus*).

Pest animal species are present within the KNE site and predate on nesting birds species and/or over-browse native vegetation, thereby preventing natural regeneration. The main predatory pest animal threats are mustelids (*Mustela* spp.), hedgehogs (*Erinaceus europeaeus*) and feral cats (*Felis catus*). Rabbits (*Oryctolagus cuniculus*) are also present in high numbers and by grazing native dune plant species prevent the establishment newly planted areas[25,26].

Recreation activities and access within the KNE site can damage the sand dunes and disturb wildlife, including nesting native birds. Both informal and managed track creation in the Riversdale Recreation reserve has affected native vegetation, including some revegetation plots. Beach access tracks from individual properties across the main Riversdale dunes can increase erosion, while green waste dumping and garden escapes have caused the spread of weeds. Uncontrolled dogs can disturb breeding birds and their chicks affecting breeding success.

While the key threats discussed in this section are recognised as the most significant, a number of other threats to the KNE site have also been identified. Table 1 below presents a summary of all known threats to the KNE site (including those discussed above), detailing which operational areas they affect, how the threat impacts on ecological values, and whether they will be addressed by the proposed management activities.

Table 1: Threats to ecological values present at the Riversdale-Orui Coast KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
Ecological weeds		
EW-1	Marram grass outcompetes and often excludes native dune species such as spinifex and pīngao. Marram is widespread and extending its range into the shorebird nesting habitat reducing the nesting habitat available	Entire KNE site
EW-2	Woody ecological weeds (exotic and non-local native) displace native species and inhibit natural regeneration altering ecosystem structure and function. Key species include wilding pines (*Pinus radiata*), gorse (*Ulex europaeus*), coastal wattle (*Acacia sophorae*), tree lucerne (*Chamaecytisus palmensis*), karo (*Pittosporum crassifolium*), banksia (*Banksia intregrifolia*), lupin (*Lupinus arboreus*), lavender (*Lavandula* spp.), evergreen buckthorn (*Rhamnus alaternus*), poplar (*Populus* spp.) and broom (*Cytisus scoparius*)	Entire KNE site
EW-3	Ground covering weeds such as tall fescue (*Schedonorus phoenix*), gazania (*Gazania* spp.), purple groundsel (*Senecio elegans*), pampas (*Cortaderia selloana*), kikuyu grass (*Pennisetum clandestinum*), Cape weed (*Arctotheca calendula*) and creeping bent (*Agrostis stolonifera*) outcompete and prevent natural regeneration of native plant species	Entire KNE site
Pest animals		
PA-1	Mustelids (stoats (*Mustela erminea*), ferrets (*M. furo*) and weasels (*M. nivalis*)) prey on native birds, lizards and invertebrates, reducing their breeding success and potentially causing local extinctions[27,28,29]. Ground-nesting shore birds are especially vulnerable to mustelids	Entire KNE site
PA-2	Hedgehogs (*Erinaceus europaeus*) prey on native invertebrates, lizards and the eggs and chicks of ground-nesting birds[30,31]	Entire KNE site
PA-3*	Cats (*Felis catus*) prey on native birds, lizards and invertebrates, reducing native fauna breeding success and potentially causing local extinctions[32,33,34]	Entire KNE site
PA-4*	Rats (*Rattus* spp.) browse native fruit, seeds and vegetation. They compete with native fauna for food and can reduce forest regeneration. They also prey on invertebrates, lizards and native birds[35,36,37]	Entire KNE site
PA-5*	House mice (*Mus musculus*) browse native fruit, seeds and vegetation, and prey on invertebrates. They compete with native fauna for food and can reduce forest regeneration. They also prey on invertebrates, lizards and small birds' eggs and nestlings[38,39]	Entire KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
PA-6*	Rabbits (*Oryctolagus cuniculus*) and hares (*Lepus europaeus*) over-browse native vegetation suppressing natural regeneration. Rabbits also disturb the ground through burrowing. Both species can have a large impact on recently-planted revegetated areas	Entire KNE site
Human activities		
HA-1	Track creation can cause habitat loss and wildlife disturbance. Pest animals such as stoats are also thought to use track networks when colonizing new areas[40]. Mowing vehicles can spread weed species seeds and plant fragments	Area C
HA-2	People and vehicles accessing the site (for recreation, work, or research purposes) can damage native vegetation, disturb native fauna, introduce the seeds of ecological weeds and increase erosion	Entire KNE site
HA-3	Uncontrolled dogs can disturb nesting birds and kill chicks and eggs of ground nesting birds.	Entire KNE site
HA-4	Exotic species incidentally introduced from residential gardens and intentionally planted exotic species can out-compete indigenous species. Weeds include agapanthus (*Agapanthus praecox*), gazania (*Gazania rigens*), gorse (*Ulex europaeus*), pampas (*Cortaderia selloana*), blackberry (*Rubus fruticosus*), cape ivy (*Senecio angulatus*) and alyssum (*Lobularia maritima*)	Entire KNE site
HA-5*	Stock access from neighbouring farms (southern wetland and dune areas) impact native ecosystems by trampling and browsing plant species.	Area C
Other threats		
OT-1*	Fire can destroy species composition and allow weed species to invade the site.	Entire KNE site

*Threats marked with an asterisk are not addressed by actions in the Operational Plan.

The codes alongside each threat correspond to activities listed in the operational plan (Table 2), and are used to ensure that actions taken are targeted to specific threats. A map of operational areas can be found in Appendix 1, Map 2.

6. Objectives and management activities

Objectives help to ensure that management activities carried out are actually contributing to improving the ecological condition of the site.

6.1. Objectives

The following objectives will guide the management activities at the Riversdale-Orui Coast KNE site.

1. **To improve the structure* and function[+] of native plant communities**
2. **To improve habitat for threatened native animals (coastal and wetland birds)**
3. **To improve the habitat for native freshwater fish**

***** The living and non-living physical features of an ecosystem. This includes the size, shape, complexity, condition, and the diversity of species and habitats within the ecosystem.

[+] The biological processes that occur in an ecosystem. This includes seed dispersal, natural regeneration, and the provision of food and habitat for animal species.

7. Management activities

Management activities are targeted to work towards the objectives above by responding to the threats outlined in Table 1. The management activities are described briefly below and specific actions with budget figures attached are set out in the Operational Plan (Table 2). It is important to note that not all threats identified in Section 2 can be adequately addressed. This can be for a number of reasons including financial, legal, or capacity restrictions.

The KNE site has been divided into three operational areas for management (Appendix 1, Map 2). These are:

A. Northern Riversdale dunes and wetlands (15.6ha)

B. Riversdale Beach dunes (6.8ha)

C. Riversdale Recreation Reserve (38.4ha)

7.1. Ecological weed control

Control of ecological weeds will be undertaken across the KNE site by GWRC (Biosecurity and Land Management departments) to reduce the density and distribution of pest plants to improve the structure and function of native plant communities. Each operational area has slightly varying requirements for weed control, though a similar strategy will be used for weed control in dunes. These are broadly discussed below.

Operational area A

Marram will be progressively controlled here annually and replaced with spinifex and pīngao (see Revegetation section and Appendix 5 for more details). Previous marram control will also be followed up. A weed sweep (survey and control of targeted weed species) through the backdune and wetland area will be done annually targeting lupin, wilding pine, poplar, pampas and bamboo.

Operational area B

Marram will be progressively controlled working in a southerly direction on an annual basis. Marram control areas will be revegetated with planted spinifex and pīngao (see Revegetation section and Appendix 5 for more details). Previous work will be followed up. A weed sweep will be done for various coastal broad-leaved weeds and isolated patches of kikuyu grass in this area annually.

Operational area C

A weed sweep for various exotic species on the escarpment and backdunes will be done annually. On the foredunes marram will be progressively controlled annually and replaced with spinifex and pīngao (see section 7.3 and Appendix 5 for more details). Previous marram control will be followed up.

MDC will control cape weed on the mown area and along the tracks annually.

7.2. Pest animal control

Predator control is undertaken in operational areas A and C to protect native shore birds, primarily New Zealand and banded dotterels and spotless crake, from predation by mustelids. See Appendix 1, Map 3 for trap locations.

Twenty DOC250 kill-traps spaced at 50m intervals are present in operational area A (the main shorebird area). These traps are serviced on a weekly basis during the nesting season (September to February) by the GWRC Biosecurity department and F&B volunteers, who alternate service checks each week and monthly thereafter.

Four DOC 250 kill-traps are located in operational area C primarily to protect spotless crake. These traps are serviced by the GWRC Biosecurity department on a fortnightly basis during the breeding season (September to February) and monthly thereafter.

7.3. Revegetation

Revegetation is required within the KNE site to ensure the stability and function of the sand dune ecosystems especially following weed control activities, and to improve and enrich habitat for native fauna.

Native plant species have been selected based on the species currently present on-site such as spinifex or pīngao, or from species likely to have been more widespread such as sand daphne (*Pimelea arenaria*) and sand tussock (*Poa bilardieri*). These will help stabilize sand dunes, improve and enrich habitats, provide an ongoing seed source and improve genetic diversity. Foredune and backdune planting will be done annually by GWRC Biosecurity department in operational areas A and C. Plants used in revegetation will be eco-sourced from the Eastern Wairarapa Ecological District.

The GWRC Land Management department will continue a programme of restoration planting following weed control in the Riversdale Beach dunes (operational area B) in partnership with the Riversdale Beach Dune Management Committee. Spinifex and pīngao will be planted in the foredunes and suitable backdune plants such as *Pimelea arenaria*, wīwī, *Coprosma acerosa* and sand tussock planted further back.

MDC are nearing the end of a three-year planting project within the Riversdale Recreation Reserve. This project consists of amenity planting along the edges of the large mown area in the northern end of the reserve, and supplementary planting of a wet area further west near the main track. This is due for completion in winter 2016. The Biodiversity department will provide advice and support if required. The Biodiversity and Land Management departments have a combined MOU agreement to guide this relationship, including funding commitments. MDC also have a maintenance budget for this reserve for mowing, boardwalks and general maintenance.

GWRC will improve habitat for indigenous fish along the Motuwairaka Stream and the stream at the northern end of the Riversdale Recreation Reserve by planting suitable species such as coastal tree daisy (*Olearia solandri*), toetoe, harakeke (*Phormium tenax*), saltmarsh ribbonwood (*Plagianthus divaricatus*) and *Carex germinata*. Planting will be undertaken annually by the Biosecurity department.

7.4. Fencing

Areas where nesting shorebirds, especially banded dotterel, New Zealand dotterel, pied stilt and variable oystercatcher, are known to breed in the northern dune and lagoon areas of operational area A have been fenced off and signage installed to try and keep vehicles and dogs away from these areas. These fences will continue to be maintained by F&B volunteers with materials supplied by the Biodiversity department. F&B volunteers also erect temporary fencing where new nesting sites outside of the main breeding area are located.

MDC are working on a fencing cost-share arrangement with the neighboring landowner to prevent stock access to the southern end of the Riversdale Recreation Reserve (operational area C). This area contains a wetland listed as Significant under the proposed Natural Resources Plan (PNRP)[41]. The Land Management and Biodiversity departments are also working with this landowner on fencing and stock access in other parts of the property under rules in the PNRP.

7.5. Other

MDC works with the Riversdale Dune Management Committee to build and maintain sand ladders, bollards to protect plantings, and to install signage in and around the Riversdale Beach dunes (operational area B). This work is largely focussed on asset protection but is also valuable in managing human access, use of the beach and dunes and helping protect existing dunes and new restoration plantings.

The Riversdale Recreation Reserve (operational area C) is a valuable asset for MDC and the Riversdale community for recreation and accessible green space and the MDC will continue to manage this area for these values. This management will continue with a programme of boardwalk construction to improve the track network and mitigate the effects of track building construction and associated drainage works. This work is funded from a MDC maintenance budget for the reserve (separate from the work in operational area B) and will vary from year to year.

8. Operational plan

The operational plan shows the actions planned to achieve the stated objectives for Riversdale-Orui Coast KNE site, and their timing and cost over the three-year period from 1 July 2016 to 30 June 2019. The budget for the 2017/18 and 2018/19 years are indicative only and subject to change. A map of operational areas can be found in Appendix 1, Map 2.

Table 2: Three year operational plan for Riversdale-Orui Coast KNE site

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2016/17	2017/18	2018/19
1, 2	EW-1	Ecological weed control	A	GWRC Biosecurity department	Progressive control of marram in foredunes	Reduction in abundance of target weed species	$1,500	$1,500	$1,500
1	EW-2, 3 HA-4	Ecological weed control	A	GWRC Biosecurity department	Weed sweep through backdunes and wetland targeting wilding pine, bamboo, poplar, alder, pampas and gorse	Reduction in abundance of target weed species	$800	$800	$800
1, 2	EW-1 EW-2 EW-3	Ecological weed control	B	GWRC Land Management department	Progressive control of marram from Motuwairaka Stream mouth south Weed sweep for other exotic coastal species mainly in the backdunes	Reduction in abundance of target weed species	$3,500	$3,500	$3,500
1, 2	EW-1	Ecological weed control	C	GWRC Biosecurity department	Progressive control of marram in foredunes in southerly direction	Reduction in abundance of target weed species	$950	$800	$800
1	EW-2, 3 HA-4	Ecological weed control	C	GWRC Biosecurity department	Two-yearly weed sweep for woody and groundcover weeds throughout back-dunes	Reduction in abundance of target weed species	$1,250	$0	$1,250

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2016/17	2017/18	2018/19
1	EW-2, 3 HA-4	Ecological weed control	C	GWRC Biosecurity department	Weed sweep for woody and groundcover weed species along escarpment	Reduction in abundance of target weed species	$1,750	$1,250	$800
1	PA-1, 2	Pest animals	A & C	GWRC Biosecurity department F&B	Service DOC250 kill-traps weekly in nesting season: alternating service checks with F&B volunteers; monthly outside this period	Mustelids <2% TTI*	$5,600	$5,600	$5,600
1	EW-1, 2 and 3	Ecological weed control	A & C	GWRC Biosecurity department	Site preparation prior to revegetation planting by spot spraying up to 250 sites on Motuwairaka Stream and Recreation Reserve stream margins each year	Sites prepared for planting well in advance e.g. April/May	$450	$450	$450
1, 2, 3	EW-1, 2, 3 HA-4	Revegetation	A & C	GWRC Biosecurity department	Plant and net streamside plants each year	70% plant survival	$1,500	$1,500	$1,500
1, 2	EW-1, 2, 3 HA-4	Revegetation	A	GWRC Biosecurity department	Progressively plant and net spinifex on foredunes	70% plant survival	$900	$900	$900
1, 2	EW-1, 2, 3 HA-4	Revegetation	B	GWRC Land Management department GWRC Biodiversity department	Supply, progressively plant and net spinifex in foredunes and threatened dunes species in backdunes each year	70% plant survival	$4,500	$4,500	$4,500

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2016/17	2017/18	2018/19
1, 2	EW-1, 2, 3 HA-4	Revegetation	C	GWRC Biosecurity department	Plant and net backdune plants each year	70% plant survival	$900	$900	$900
1, 2	EW-1, 2, 3 HA-4	Revegetation	C	GWRC Biosecurity department	Progressively plant and net foredune plants each year	70% plant survival	$1,700	$1,700	$1,700
2	HA-2 and 3	Fencing	A	F&B GWRC Biodiversity department	Protection of ground-nesting birds	Main fence is maintained, nests outside area temporarily protected if found Adequate materials provided	$500**	$500**	$500**
1	HA-1 and 2	Other	B	MDC Riversdale Beach Dune Management Committee	Protect restoration plantings and manage human impacts via sand ladders, bollards and rope and signage	Ongoing work to formalize and maintain access points and protect ecological restoration work	$2,500	$2,500	$2,500
						Total	**$28,300**	**$26,400**	**$27,200**

*TTI = Tracking Tunnel Index. The control regime has been created designed to control rats and mustelids to this level. Experience in the use of this control method indicates this target will be met.

**Fencing materials provided by GWRC; labour by Forest & Bird volunteers.

9. Funding summary

9.1. GWRC budget

The budget for the 2017/18 and 2018/19 years are indicative only and subject to change.

Table 3: GWRC Biodiversity allocated budget for the Riversdale-Orui Coast KNE site

Management activity	Timetable and resourcing		
	2016/17	2017/18	2018/19
Ecological weed control*	$10,200	$8,300	$9,100
Pest animal control	$5,600	$5,600	$5,600
Re-vegetation**	$9,500	$9,500	$9,500
Fencing/Advice	$500	$500	$500
Total	**$ 25,800**	**$ 23,900**	**$ 24,700**

* Costs shared between GWRC Biodiversity and Land Management departments in Area B: $6,700 and $3,500 respectively in year one. Year two and three are indicative but likely $4,800 and $3,500 in year two and $5,600 and $3,500 in year three respectively

** $4,500 from GWRC Land Management department in Area B only; $5,000 from GWRC Biodiversity department across the KNE site

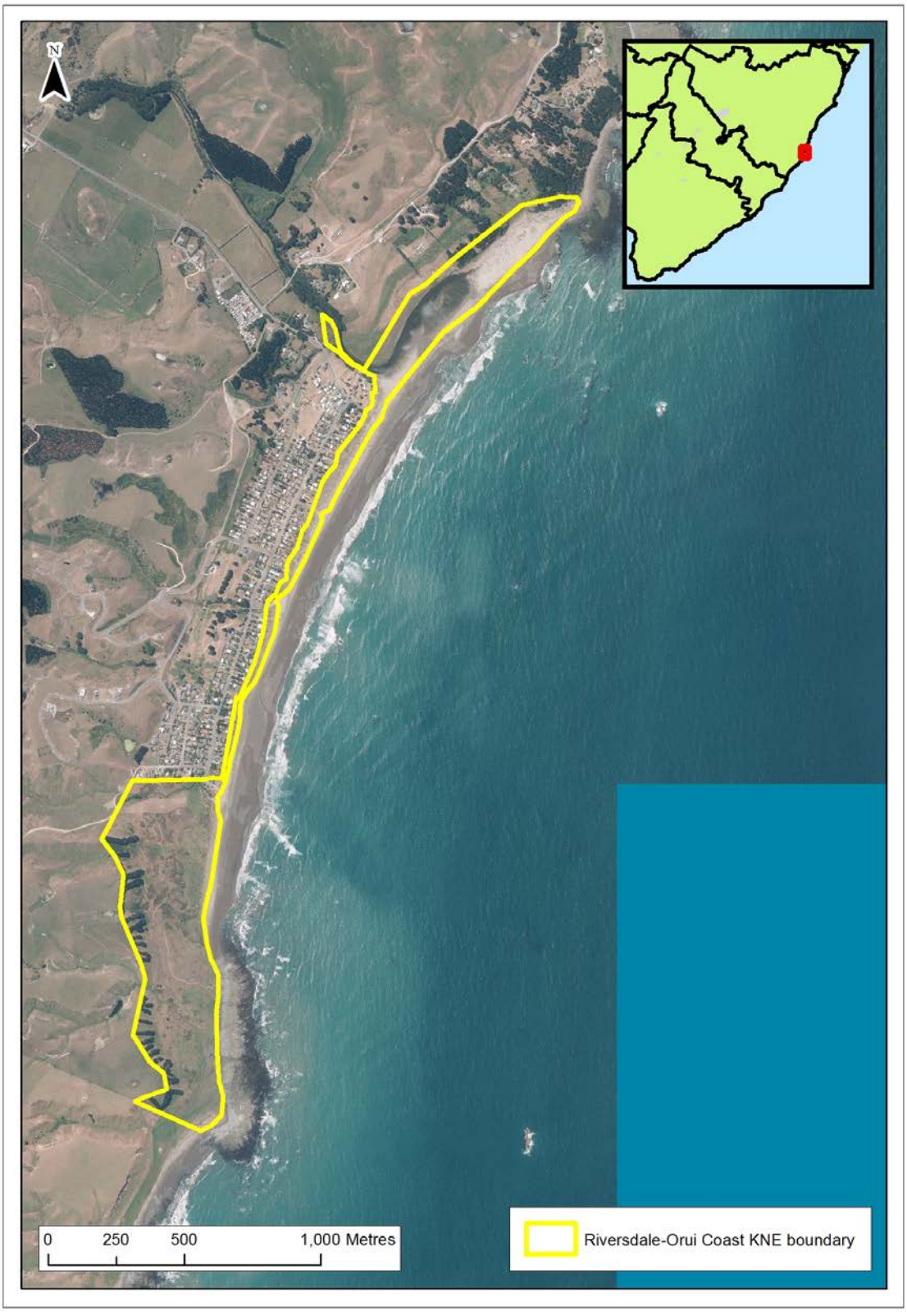
9.2. MDC budget

The budget is subject to confirmation through the Masterton District Council long term planning process, and is allocated in partnership with the Riversdale Dune Management Committee.

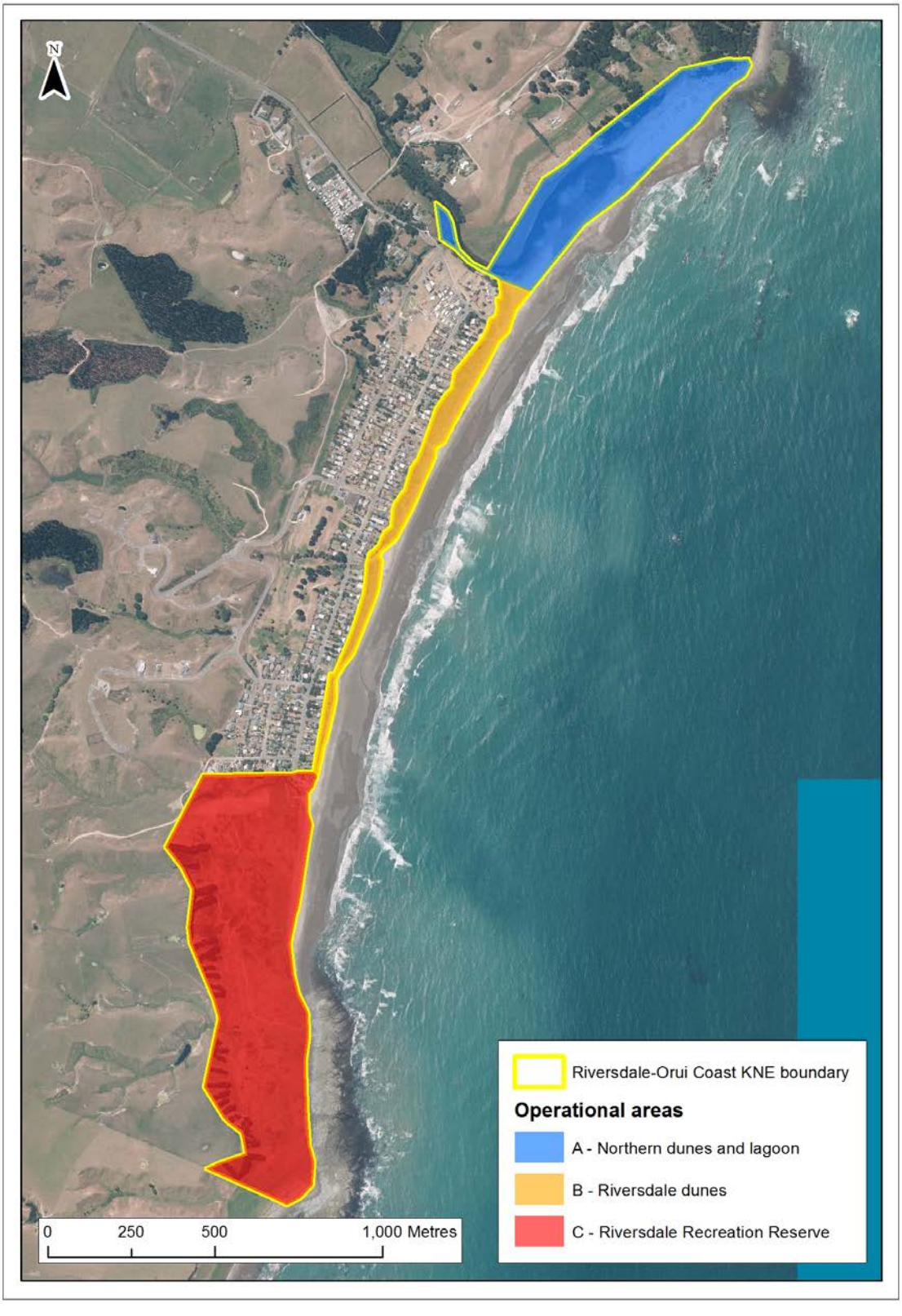
Table 4: Additional allocated budget for the Riversdale-Orui Coast KNE site from MDC

Management activity	Timetable and resourcing		
	2016/17	2017/18	2018/19
Other – sand ladders, bollards and rope, signage in Area B	$2,500	$2,500	$2,500

Appendix 1: Site maps



Map 1: Riversdale-Orui Coast KNE site boundary



Map 2: Operational areas in the KNE site

Map 3: Pest animal control locations in the KNE site

Appendix 2: Nationally threatened species list

The New Zealand Threat Classification System lists species according to their threat of extinction. The status of each species group (plants, reptiles, etc.) is assessed over a three-year cycle[42] with the exception of birds that are assessed on a five-year cycle[43]. Species are regarded as Threatened if they are classified as Nationally Critical, Nationally Endangered or Nationally Vulnerable. They are regarded as At Risk if they are classified as Declining, Recovering, Relict or Naturally Uncommon. The following table lists Threatened and At Risk species that are resident in or regular visitors to, the Riversdale-Orui KNE site.

Table 5: Threatened and At Risk species at the Riversdale-Orui Coast KNE site

Scientific name	Common name	Threat status	Observation
Plants (vascular)[44]			
Coprosma acerosa	Sand coprosma	At Risk - Declining	Eastern Wairarapa Ecological District report[45]
Ficinia spiralis	Pīngao	At Risk - Declining	Eastern Wairarapa Ecological District report
Pimelea arenaria	Sand daphne	At Risk - Declining	Eastern Wairarapa Ecological District report
Birds[46]			
Anarhynchus frontalis	Wrybill	Threatened - Nationally Vulnerable	eBird records[47]
Anthus novaeseelandiae	New Zealand pipit	At Risk - Declining	eBird records
Charadrius bicinctus bicinctus	Banded dotterel	Threatened - Nationally Vulnerable	eBird records
Charadrius obscurus	New Zealand dotterel	Threatened - Nationally Vulnerable	R. Smith, GWRC, pers. obs. 2012 eBird records
Chlidonias albostriatus	Black-fronted tern	Threatened - Nationally Endangered	eBird records
Haematopus finschi	South Island oystercatcher	At Risk - Declining	eBird records
Haematopus unicolor	Variable oystercatcher	At Risk - Recovering	eBird records
Himantopus himantopus leucocephalus	Pied stilt	At Risk - Declining	eBird records
Hydroprogne caspia	Caspian tern	Threatened - Nationally Vulnerable	eBird records
Larus bulleri	Black-billed gull	Threatened - Nationally Critical	eBird records

Scientific name	Common name	Threat status	Observation
Larus novaehollandiae scopulinus	Red-billed gull	Threatened - Nationally Vulnerable	eBird records
Limosa lapponica baueri	Eastern bar-tailed godwit	At Risk - Declining	eBird records
Phalacrocorax carbo novaehollandiae	Black shag	At Risk - Naturally Uncommon	eBird records
Phalacrocorax sulcirostris	Little black shag	At Risk - Naturally Uncommon	eBird records
Phalacrocorax varius varius	Pied shag	Threatened - Nationally Vulnerable	eBird records
Platalea regia	Royal spoonbill	At Risk - Naturally Uncommon	eBird records
Porzana tabuensis	Spotless crake	At Risk - Relict	Cheyne J. 2013[48]
Poliocephalus rufopectus	New Zealand grebe	Threatened - Nationally Vulnerable	eBird records
Puffinus gavia	Fluttering Shearwater	At Risk - Relict	eBird records
Sterna striata striata	White-fronted tern	At Risk - Declining	eBird records
Freshwater fish[49]			
Anguilla dieffenbachia	Longfin eel	At Risk - Declining	NIWA freshwater fish database[50]
Galaxias maculatus	Inanga	At Risk - Declining	NIWA freshwater fish database
Gobiomorphus huttoni	Redfin bully	At Risk - Declining	NIWA freshwater fish database
Invertebrates (Araneae – spiders)[51]			
Latrodectus katipo	Katipō spider	At Risk - Declining	B. Patrick, 2002[52]

Appendix 3: Regionally threatened plant species list

The following table lists regionally threatened plant species that have been recorded in the Riversdale-Orui Coast KNE site. Native plant species have been identified in the Plant Conservation Strategy, Wellington Conservancy 2004-2010[53].

Table 6: Regionally threatened plant species recorded in Riversdale-Orui Coast KNE site

Scientific name	Common name	Threat status	Source
Plants[54]			
Coprosma acerosa	Sand coprosma	Gradual decline	Eastern Wairarapa Ecological District report[55]
Discaria toumatou	Matagouri	Serious decline	Eastern Wairarapa Ecological District report
Ficinia spiralis	Pīngao	Gradual decline	Eastern Wairarapa Ecological District report
Plagianthus divaricatus	Saltmarsh ribbonwood	Sparse	Eastern Wairarapa Ecological District report

Appendix 4: Planting plans

Below are the details of the revegetation work that will be undertaken in the Riversdale-Orui Coast KNE site over the three years of this plan. The tables show plant species to be used where confirmed, numbers of plants and all known costs associated with the planting programme.

Operational area A

Northern dunes

A small number of spinifex (*Spinifex sericeus*) will be planted each year by GWRC Biosecurity department to replace marram grass.

Table 7: Planting cost for operational area A northern dunes

	2016/17		2017/18		2018/19	
	Number	**Total ($)**	**Number**	**Total ($)**	**Number**	**Total ($)**
Plants	150	340	150	340	150	340
Planting labour		560		560		560
Total		**$900**		**$900**		**$900**

Motuwairaka Stream southern margin

Small numbers of plants will be planted along the stream margins annually by GWRC Biosecurity department. Species will include *Plagianthus divaricatus*, *Phormium tenax*, *Austroderia toetoe, Carex geminata* and *Olearia solandri.*

Table 8: Planting cost for operational area A Motuwairaka Stream margin

	2016/17		2017/18		2018/19	
	Number	**Total ($)**	**Number**	**Total ($)**	**Number**	**Total ($)**
Plants	150	340	150	340	150	340
Planting labour		560		560		560
Total		**$900**		**$900**		**$900**

Operational area B

Riversdale Beach dunes

This area will be planted with spinifex (*Spinifex sericeus*) and pīngao (*Ficinia spiralis*) by the GWRC Land Management department following marram grass control. Cost includes planting labour and protective nets.

Table 9: Planting cost for operational area B dunes

	2016/17		2017/18		2018/19	
	Number	**Total ($)**	**Number**	**Total ($)**	**Number**	**Total ($)**
Plants	1,900	4,500	1,900	4,500	1,900	4,500
Total		**$4,500**		**$4,500**		**$4,500**

Operational area C

Recreation Reserve backdune

Small areas will be confirmed annually and planted with sand daphne (*Pimelea arenaria*) and sand tussock (*Poa billadieri*) by GWRC Biosecurity department.

Table 10: Planting cost for operational area C Recreation Reserve backdune

	2016/17		2017/18		2018/19	
	Number	**Total ($)**	**Number**	**Total ($)**	**Number**	**Total ($)**
Plants	150	340	150	340	150	340
Planting labour		560		560		560
Total		**$900**		**$900**		**$900**

Recreation Reserve foredune

Spinifex and pīngao will be progressively planted following marram control by GWRC Biosecurity department.

Table 11: Planting cost for operational area C Recreation Reserve foredune

Plant (scientific name)	2016/17		2017/18		2018/19	
	Number	**Total ($)**	**Number**	**Total ($)**	**Number**	**Total ($)**
Plants	280	660	280	660	280	660
Planting labour		1,040		1,040		1,040
Total		**$1,700**		**$1,700**		**$1,700**

Stream margins

Small numbers of plants will be planted along the stream margins annually by GWRC Biosecurity department. Species will include *Plagianthus divaricatus*, *Phormium tenax*, *Austroderia toetoe, Carex geminata* and *Olearia solandri.*

Table 12: Planting cost for operational area C Recreation Reserve stream margins

Plant (scientific name)	2016/17		2017/18		2018/19	
	Number	Total ($)	Number	Total ($)	Number	Total ($)
Plants	100	230	100	230	100	230
Planting labour		370		370		370
Total		**$600**		**$600**		**$600**

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